
CHAPTER 3

INSTALLATION, MAINTENANCE AND INSPECTION

Before the work is scheduled to begin, the foreman and/or inspector should check all signs, pavement marking material, and channelizing devices that are to be used. All devices should be:

- Standard in size, shape, color, or message;
- In good condition, not needing repair; and
- Reflectorized.

If a particular device does not meet all of the above requirements it should be replaced with one that does. Additional devices should be available to replace any that may be damaged while the work is in progress. On construction, the inspector and foreman should be in agreement that the devices are satisfactory before they are placed on the roadway.

Reflectorized devices need extra care when handling and transporting to ensure that the reflectorizing elements are not damaged.

Existing signs that do not apply during construction, maintenance, or utility work should be removed or completely covered. Burlap or other materials that are not opaque are not acceptable. At night, non-opaque materials let the messages be seen because headlights reflect the message through the material.

Work area signs that are installed before traffic patterns are changed should be covered, rotated, or folded in half so drivers cannot read the message.

Since many maintenance, utility, and emergency operations require the same devices for each job, vehicles should be equipped with an adequate supply of commonly used portable devices.

A. Installation and Removal

1. Order of Placement

Traffic control devices should be placed in the order that drivers will see them, starting with the sign or device that is farthest from the work area and placing the others as the work area is approached. If traffic in both directions will be affected, such as with work in the center lanes, the devices can be placed in both directions at the same time, starting at each end farthest from the work area.

When one direction of traffic will be directed into opposing traffic lanes, such as shown in Figures 16 and 18 (pages 70 and 72), the signs, devices, and pavement markings for the opposing traffic should be placed first. When the signs and devices are across from or at the work area, the devices for the oncoming direction can then be set up. (It is essential to channelize opposing traffic out of its lane before moving the oncoming traffic into the lane.)

When signs or channelizing devices are to be installed and removed several times during the work operation, a spot should be painted where the devices are located so the installation can be repeated quickly and so that proper placement is assured. The devices should be stored off the roadway, out of sight, or transported to another location.

Motorists do not expect to encounter workers in the roadway setting up a traffic control zone. Since the goal is to make the entire operation safe, high-level warning devices, flaggers, or flashing vehicle lights should be used to warn the drivers of the presence of workers. Flashing arrow panels are valuable to assist the workers during placement or removal of channelizing devices for lane closures.

2. Removal of Devices

As soon as the work is completed and the devices are no longer needed, they should be removed. Devices should be removed in the opposite order of installation by starting with the devices closest to the work area and continuing away from the area. Flashing arrow panels, high-level warning devices, flaggers, and/or flashing vehicle lights should be used for the removal process.

3. Pavement Marking Removal

Motorists use pavement markings as a primary source of guidance. Temporary pavement markings, such as pressure-sensitive traffic tape or raised pavement markings, can be used with other devices in a traffic control zone. Any pavement markings that are no longer applicable or that may confuse drivers should be removed as soon as practicable.

Traditionally, methods of removal include grinding, burning, chemical treatment, sandblasting, hydroblastic, and high pressure water jetting (List of References #5). Over-painting markings that are no longer appropriate with black paint and bituminous solutions is specifically disallowed by the MUTCD. This treatment has proved unsatisfactory since the original lines eventually reappear as the overlying material wears away under traffic. In addition, lines which are covered in this way are still visible under certain conditions (low angles of illumination).

B. Inspection and Maintenance Program

1. Purpose

Once the traffic control zone is established, it is important to ensure that it continues to function as it was intended; installed and perhaps subsequently modified as a result of the evaluation process.

Maintenance is needed to service the equipment and make corrections which may be required due to any combination of the following factors.

On highway construction projects, this is normally the responsibility of the contractor.

- Traffic accidents;
- Device displacement:
 - vehicular contact,
 - slip stream from trucks,
 - workers,
 - wind;
- Damage caused by construction activities;
- Weather created damage;

- Malfunctions and burn outs;
- Consumption of energy:
 - battery-operated lights,
 - gasoline generators;
- Physical deterioration;
- Dust and grime:
 - on sign faces,
 - on reflectorized rails;
- Dirt and debris:
 - on roadways; and
- Vandalism.

2. **Elements of an Inspection Program**

A comprehensive inspection and maintenance program should include the following elements:

- A formalized plan;
- Defined inspection procedures;
- A form on which the findings of the field inspection are recorded;
- A repair program;
- Assurance of an adequate inventory of devices for emergency replacement or repairs;
- Check procedures to assure that specified repairs are made;
- Identify possible causes of accidents or skid marks;

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- A review to insure that the travel path is clearly marked through the entire work zone, both day and night; and
 - Formal documentation of inspections and repairs made.

The inspector will be faced with the need to make decisions during the inspection and must exercise judgment in establishing appropriate practices.

A key element of the program is the procedure which insures that the required maintenance is performed. When the corrective action is taken, it should be so noted in order that documentation is complete.

3. Responsibility

For each project, an individual should be assigned the responsibility for traffic control. On construction projects, the contractor should designate a specific person by name and telephone number. In addition, on large projects, the traffic control responsibility should be assigned to an employee in the agency's organization. Routine inspections of the traffic control installation should be carried out by these individuals.

Less frequent but periodic inspections should be performed by senior staff of the contractor (typically the superintendent) and the agency (the resident engineer and/or the traffic engineer).

Lines of communication and responsibility should be clearly established between individuals in control of routine maintenance activities and those with greater authority, so that urgent problems that arise from time to time can be brought promptly to the attention of officials who are in a position to respond immediately.

4. Frequency

To determine the frequency with which inspections should be performed, the following factors should be considered:

- Project size and duration;
- Nature of work activity;
- Complexity of traffic control;
- Frequency at which damage is occurring; and

- Number of deficiencies observed during previous inspections.

Traffic controls that are left in place overnight should be inspected during hours of darkness at the same frequency as during the daylight hours. Holiday and weekend inspections should be made as needed.

5. Record Keeping

Good record keeping procedures suggest that the time and location of the installation and removal of traffic control devices be noted. Although this can be time consuming for a moving maintenance operation, it is important to record significant traffic control actions taken by the field crew. It is desirable that this include:

- Starting and ending time of work;
- Location of work;
- Type, condition and position of traffic control devices;
- Names of personnel;
- Type of equipment used; and
- Any change in temporary or permanent regulatory devices.

Major projects will require more detailed record keeping, since they may involve greater amounts of funds, outside (Federal or State aid) funding sources, and longer distances and times of physical exposure to the workers, motorists, or pedestrians.

Several methods of recording traffic controls are available. These include:

- Use of photo logging;
- Photographs either keyed to a diary or containing a brief description of:
 - time,
 - location,
 - direction,
 - photographer's name;

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- Special notes on construction plans (preferably the traffic control plan sheet); and
 - Daily diary entries of times, location, and names of individuals (when known) involved in the:
 - installation,
 - change, and
 - removal of traffic control devices.

Change orders or work orders also serve as a reference, and should be keyed to the diary when used.

When the inspection process reveals a condition that requires correction, the documentation should include:

- Description of the correction needed, when it was noted, and by whom;
- Corrections made or deferred and why;
- Replacements made or deferred and why; and
- Any other needed actions.

C. Legal Liability

Highway personnel should anticipate the likelihood of lawsuits in the event of an accident or other grievance suffered by an injured citizen. To prevent or minimize such litigation, and to help defend lawsuits, the following steps are recommended:

- Know and comply with the traffic control for street and highway construction and maintenance operations set forth in the Ohio MUTCD, this Handbook and other nationally accepted engineering standards and practices.
- Provide properly working devices at the site, particularly when unattended (nights, weekends, etc.).
- Document all actions taken on or related to traffic controls that are placed in effect at the work site.

- Inspect the work site at frequent intervals with a view to detecting and immediately correcting deficiencies in traffic control.
- Remove all material and equipment not needed at the site as soon as possible. (This applies also to traffic control devices that cease to be needed.)
- Provide warning and protection to motorists, pedestrians, and workers for potential conflicts and hazards that may result from the work being done at the site or from a vehicle striking a device.

D. Documentation for Protection

Since it is not known when an accident will occur, the key to defending cases in courts of law is advanced preparation. Highway personnel and contractors should maintain a careful record of job related activities so they may document their efforts to provide good traffic control at the work site. The record system should reflect priorities and a planned safety program.

The following steps are recommended as a means of establishing effective project documentation:

- Maintain up-to-date engineering drawings.
- File all pertinent memoranda and correspondence.
- Reference standards and specifications.
- Keep daily project diary.
- Perform and document routine inspections.
- Follow all safety regulations.
- Conduct personnel safety training.
- Document all instructions to contractors or subcontractors.

- Take photographs at key project stages and for unusual situations.

In case of an accident, project personnel should promptly record and document the circumstances and pertinent factors. Photographs are recommended.